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IS 7594-2 (1979): Magnetic Sound Tape Recording and Reproducing Equipment (Cassette), Part 2: Domestic Type [LITD 7: Audio, Video and Multimedia Systems and Equipment]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 7594 (Part II) - 1979
(Reaffirmed 1995)

Indian Standard
SPECIFICATION FOR
MAGNETIC SOUND TAPE RECORDING AND
REPRODUCING EQUIPMENT (CASSETTE)

PART II DOMESTIC TYPE

(*First Revision*)

First Reprint JULY 1997

UDC 681.846.7

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR MAGNETIC SOUND TAPE RECORDING AND REPRODUCING EQUIPMENT (CASSETTE)

PART II DOMESTIC TYPE

(First Revision)

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SPECIFICATION FOR MAGNETIC SOUND TAPE RECORDING AND REPRODUCING EQUIPMENT (CASSETTE)

PART II DOMESTIC TYPE

(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (Part II) (First Revision) was adopted by the Indian Standards Institution on 20 July 1979, after the draft finalized by the Recording Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The object of this standard is to specify general and performance requirements for magnetic sound tape recording and reproducing equipment (cassette type) used for domestic purposes such as entertainment.

0.3 This standard was originally published in 1975. It has been revised to incorporate the latest developments and the references to methods of measurements of specified characteristics.

0.4 Manufacture of such equipment is being established in the country. It has been felt that this standard will provide suitable guidance for such manufacturers.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2 - 1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part II) covers general and minimum performance requirements of ac and/or battery operated twin-track, mono-aural sound recording and reproducing equipment utilizing twin hub cassette, primarily used for entertainment purposes.

*Rules for rounding off numerical values (revised).

IS : 7594 (Part II) - 1979

1.1.1 The tape recorder part of a combined unit such as radio receiver *cum* tape recorder or radio receiver *cum* record player *cum* tape recorder is also covered by this standard.

2. TERMINOLOGY

2.1 For the purpose of this standard, the terms and definitions covered in IS : 1885 (Part III/Sec 3) - 1967*, in addition to the following, shall apply.

2.1.1 Type Tests — Tests carried out to prove conformity with the requirements of the relevant specification. These are intended to check the general qualities and design of a given type of tape recorder.

2.1.2 Acceptance Tests — Tests carried out on samples selected from a lot for the purpose of acceptance of the lot.

2.1.2.1 Lot — All tape recorders of the same type, category and rating manufactured by the same factory during the same period using the same material and process.

2.1.3 Routine Tests — Tests carried out on each and every unit to check the requirements which are likely to vary during production.

3. DESIGN AND CONSTRUCTION

3.0 General — The equipment shall operate from ac and/or battery. It shall be complete with all accessories and controls for operation.

3.1 Tape Transport Assembly — It shall contain all the mechanical arrangements for transporting the tape. During recording or reproduction the tape speed shall be essentially a sole function of the peripheral velocity of the capstan surface. The maximum diameter of the capstan shall be 3 mm.

3.2 Cassette Loading — The tape transport shall be designed to facilitate simple loading. It shall be so adjusted that during the tape start, running or stop modes, loops or any other unfavourable tape conditions do not develop.

3.3 Housing — Housing shall be an integral part of the equipment. The cassette compartment shall be provided with a suitable lid having a transparent window. A protective cover shall be provided with a suitable window.

*Electrotechnical vocabulary: Part III Acoustics, Section 3 Sound recording and reproduction.

AMENDMENT NO. 1 NOVEMBER 1984

TO

IS:7594(Part 2)-1979 SPECIFICATION FOR MAGNETIC
SOUND TAPE RECORDING AND REPRODUCING
EQUIPMENT (CASSETTE)

PART 2 DOMESTIC TYPE

(First Revision)

(Page 5, clause 5.5) - Add the following new clause 5.6 after this and renumber the subsequent clauses accordingly:

'5.6 A suitable mechanism shall be incorporated in the equipment to prevent accidental erasure of a pre-record pre-recorded signal when the lug on the cassette housing has been removed.'

[Page 7, clause 8.1(a)(3)] - Delete.

(Page 8, clause 10.2) - Substitute '9 of IS:4377-1981*' for '4.1 of IS:6370-1971*'.
IS:4377-1981*'

(Page 8, clause 10.3) - Substitute '9 of IS:4377-1981*' for '4.3.2 of IS:6370-1971*'.
IS:4377-1981*'

(Page 8, foot-note with '*' mark) - Substitute the following for the existing foot-note:

'*General requirements for magnetic sound tape recording and reproducing systems (*first revision*).'

(Page 8, clause 10.5, line 2) - Substitute '315 Hz for '1 000 Hz'.

(Page 8, clause 10.6, line 2) - Substitute 'reference recording level' for 'recording level'.

(Page 11, Fig. 1) - Add the following matter below the figure:

$$\begin{aligned} f_1 &= 80 \text{ Hz}; & f_2 &= 160 \text{ Hz}; & f_3 &= 4\,000 \text{ Hz}; \\ f_4 &= 8\,000 \text{ Hz}. \end{aligned}$$

(LTDC 23)

3.4 Carrying Means — A suitable carrying means shall be provided. Facilities for carrying accessories shall be provided. Where a separate carrying case is provided, it shall also have facilities for storing the normal accessories.

4. CASSETTES

4.1 The equipment shall be capable of handling all cassettes conforming to IS : 6370-1971*.

5. INDICATORS CONTROLS AND OTHER COMPONENTS PARTS

5.1 Record Level Indicator — In the absence of a built-in automatic record level control, a suitable record level indicator shall be provided.

5.2 Battery Voltage Indicator — A suitable battery voltage indicator shall be provided. This may be combined with record level indicator, when provided.

5.3 Tape Motion Controls — All controls essential to the operation of the tape transport shall be located on the same panel and area of equipment. The following controls essential for operation of the tape transport shall be conveniently located:

- a) Stop,
- b) Play,
- c) Record (*see Note*),
- d) Wind, and
- e) Rewind.

NOTE — The record switch shall be suitably marked for easy identification 'preferably in red'.

5.3.1 During the record and reproduce modes when the tape reaches its end, either the driving unit of the tape shall stop automatically or the tape mechanisms shall disengage from the driving unit of the tape.

5.4 Record/Reproduce Volume Control — Easily accessible controls shall be provided to adjust the amplifier gains during recording and reproducing.

NOTE — When automatic recording is provided, the record control need not be provided.

5.5 Eraser — The equipment shall have suitable means to automatically erase the prerecording on the tape before a new recording is made.

*Specification for tape cassettes for domestic use.

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5.6 Loudspeaker — Loudspeaker of permanent magnet type shall be provided as an integral part (either as built-in or external) of the unit.

5.7 Motors — The motors shall be capable of operating satisfactorily in all modes of operation.

5.7.1 The motor shall be provided with a speed regulating device so that the speed is controlled at reduced battery voltages up to 0.9 V per cell.

5.8 Optional Indicators and Controls

5.8.1 Tape Position Indicator — A suitable tape position indicator such as elapsed time indicator may be provided to show the amount of tape used.

5.8.2 Automatic Record Level Control — The automatic record level control, when provided, shall be such that it starts functioning when the input signal level increases by 3 dB above standard record level.

5.8.3 Supply ON/OFF Switch — The mains supply ON/OFF switch should be on mains side of the recorder and completely isolate the recorder when in the OFF position.

5.8.4 Pause and Eject Controls — Suitable pause and eject controls may be provided.

NOTE — The eject control, if provided, shall be independent of any other control.

5.8.5 Facilities for headphones, earphones and external loudspeakers shall be provided.

6. POWER SUPPLY

6.1 Supply — The equipment shall be capable of operating either from ac mains or battery or both.

6.1.1 Battery Operation — The equipment shall operate from suitable batteries as specified by the manufacturer. The number and type of cells shall be indicated. The batteries shall be housed inside the recorder.

6.1.2 Mains Operation — The equipment shall operate from 240 V \pm 10 percent, 50 Hz ac power source either with built-in or external battery eliminator.

7. SAFETY

7.1 The equipment shall conform to the relevant requirements specified in IS : 616-1957* in so far as mains operation is concerned.

*Code of safety requirements for mains-operated radio receivers.

8. ACCESSORIES

8.1 Each tape recorder unit shall be supplied with the following accessories:

a) Essential:

- 1) Microphone with remote ON/OFF facility with connecting cable (when there is no built-in microphone),
- 2) Power supply chord for mains operation, and
- 3) Loudspeaker connecting cable where the loudspeaker is not built-in.

b) Optional:

- 1) Earphone;
- 2) Battery eliminator unit;
- 3) Battery charger;
- 4) Connector for input/output; and
- 5) Separate microphone with/without ON/OFF facility and connecting cable, where there is built-in microphone on the tape recorder.

9. INPUT AND OUTPUT FACILITIES

9.1 Amplifier Inputs — The record amplifier shall have two inputs, one shall be microphone and the other an auxiliary input.

9.1.1 Microphone Input — An input jack or socket shall be provided which shall operate the equipment satisfactorily from the microphone provided by the manufacturer. The values of the microphone input impedance shall be specified. Where the tape recorder is provided with a built-in microphone, the microphone input for external microphone will be an optional feature.

9.1.2 Auxiliary Input — An input jack or socket shall be provided to operate the equipment satisfactorily from an input line of high impedance source that shall produce a minimum voltage of 100 mV across the input. The value of the input impedance shall be specified.

NOTE 1 — If multipin sockets are used, the two inputs (namely, microphone input and auxiliary input) may be combined in one.

NOTE 2 — When auxiliary input is applied, the built-in microphone, if any, should automatically be disconnected from the circuit.

9.2 Amplifier Outputs — An output jack or socket for external loudspeaker of impedance 3 to 8 ohms shall be available. This jack/socket shall have the facility to automatically disconnect the internal loudspeaker when the external loudspeaker is connected.

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9.2.1 Output for radio/amplifier/sound recorder may be provided as an optional facility. The voltage available at this point shall not be less than 100 mV across a high impedance (minimum 1.5 kohms).

10. PERFORMANCE REQUIREMENTS

10.1 Tape Speed — The tapes shall move at the speed of 4.76 cm/s ± 2.0 percent at the following voltages:

Battery operated (both zinc-carbon cells and nickel cadmium cells)	Rated voltage
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AC mains operated	Rated voltage
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10.2 Recording Characteristics — Provisions of **4.1** of IS : 6370-1971* shall apply.

10.3 Reproduce System Response — Provisions of **4.3.2** of IS : 6370-1971* shall apply.

10.4 Rated Output Power — The rated output power of the playback amplifier shall be at least 300 mW.

10.5 Distortion — The overall recrod reproduce system total harmonic distortion shall be less than 5 percent for a 1000 Hz sine wave signal at the rated output power.

10.6 Signal-to-Noise Ratio — The signal-to-noise ratio shall not be less than 40 dB at recording level.

10.7 Wow and Flutter — The peak weighted flutter content when reproducing an essentially flutter-free recording shall not exceed ± 0.6 percent at any portion of the cassette in use.

10.8 Fast Forward and Rewind — The equipment shall wind (fast forward or rewind) a C-60 cassette in less than 90 seconds.

11. TESTS

11.0 General — Unless otherwise specified, all the tests shall be conducted under normal supply voltage conditions specified in **3.1** of IS : 7594 (Part I) - 1978†.

*Specification for tape cassettes for domestic use.

†Specification for magnetic sound tape recording and reproducing equipment (cassette type): Part I Methods of measurement.

11.1 Classification of Tests

11.1.1 Type Tests — The tests specified in Table 1 shall constitute type test and shall be carried out in the same sequence in which they appear in Table 1.

TABLE 1 SCHEDULE OF TESTS

Sl No.	TEST	METHODS OF MEASUREMENT. REF TO CLAUSE	REQUIREMENTS, REF TO CLAUSE
(1)	(2)	(3)	(4)
1. All Samples			
a)	Electrical performance tests	} in IS : 7594 (Part 1)- 1978*	
i)	Tape speed		10.1
ii)	Recording characteristic		10.2
iii)	Reproduce system response		10.3
iv)	Overall system response		The overall system response shall fall within the limits specified in Fig. 1
v)	Distortion		10.5
vi)	Signal-to-noise ratio		10.6
	Electronic noise		Sl No. 17 of Table 1
	Overall		Sl No. 18 of Table 1
vii)	Wow and flutter	10.7	
viii)	Fast forward and rewind	10.8	
ix)	Rated output power	10.4	

Samples shall then be divided into three groups and tape recorder in each group shall undergo the tests specified for each group.

2. First Group

a)	Climatic sequence test	11.2	11.2
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3. Second Group

a)	Drop test	11.3	11.3
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4. Third Group

a)	Operating life test	11.4	11.4
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*Specification for magnetic sound tape recording and reproducing equipment (cassette type): Part I Methods of measurement.

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11.1.1.1 Number of samples — The number of samples shall be three tape recorders of the same model, type and ratings (selected preferably at random from a regular production lot) and distributed as given below for the purpose of type tests:

a) Electrical performance tests	All the three
b) Climatic sequence tests	One
c) Drop tests	One
d) Operating life tests	One

11.1.1.2 Criteria of acceptance — There shall be no single failure in any of the type tests.

11.1.2 Acceptance Tests — The acceptance tests shall be carried out on a limited numbers of samples selected in accordance with the sampling procedure given in Appendix A and which have passed the routine tests. The tests specified in Table 2 shall constitute acceptance tests.

TABLE 2 ACCEPTANCE TESTS

Sl. No.	TEST	METHODS OF MEASUREMENT, REF TO CLAUSE IN IS : 7594 (PART I) - 1978*	REQUIREMENTS, REF TO CLAUSE
(1)	(2)	(3)	(4)
1.	Tape speed	5.4	10.1
2.	Recording characteristic	5.8.3.1	10.2
3.	Reproduce system response	5.8.3.2	10.3
4.	Overall system response	5.8.3.3	The overall system response shall fall within the limits specified in Fig. 1
5.	Distortion	5.9	10.5
6.	Signal-to-noise ratio:		
	Electronic noise	Sl No. 17 of Table 1 }	10.6
	Overall	Sl No. 18 of Table 1 }	
7.	Wow and flutter	5.7	10.7
8.	Fast forward and rewind	5.6	10.8
9.	Rated output power	5.12	10.4

*Specification for magnetic sound tape recording and reproducing equipment (cassette type): Part I Methods of measurement.

11.1.3 Routine Tests — The tests specified in Table 3 shall constitute routine tests.

TABLE 3 ROUTINE TESTS

SL No.	TEST	METHODS OF MEASUREMENT, REF TO CLAUSE IN IS : 7594 (PART I) - 1978*	REQUIREMENTS, REF TO CLAUSE
(1)	(2)	(3)	(4)
1.	Tape speed	5.4	10.1
2.	Distortion	5.9	10.5
3.	Signal-to-noise ratio		
	Electronic noise	Sl No. 17 of Table 1	10.6
	Overall	Sl No. 18 of Table 1	
4.	Wow and flutter	5.7	10.7
5.	Fast forward and rewind	5.6	10.8
6.	Reproduce system response	5.8.3.2	10.3
7.	Overall system response	5.8.3.3	The overall system response shall fall within the limits specified in Fig. 1

NOTE — High voltage test is under consideration.

*Specification for magnetic sound tape recording and reproducing equipment (cassette type): Part I Methods of measurement.

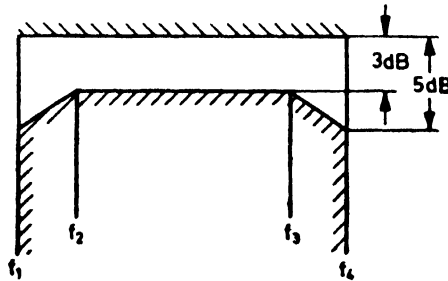


FIG. 1 TOLERANCES FOR FREQUENCY RESPONSE

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11.2 Climatic Sequence Tests — The climatic sequence should consist of the following:

- a) *Dry Heat Test* (at a Temperature of $+40^{\circ}\text{C}$ and Duration of 96 Hours) — in accordance with IS : 9000 (Part III) - 1977*.
- b) *Damp Heat* — first cycle in accordance with IS : 2106 (Part II) - 1962†.
- c) *Cold* (at a Temperature of -10°C and Duration of 16 Hours) — in accordance with IS : 9000 (Part II) - 1977‡, and
- d) *Damp Heat* — second cycle in accordance with IS : 2106 (Part II) - 1962† followed by a recovery period of 24 hours.

11.2.1 At the end of the climatic sequence, the tape recorder shall meet the following performance:

- a) Tape speed shall be as specified in **10.1**;
- b) Flutter and wow shall not exceed ± 0.8 percent; and
- c) Reproduce system response, rated output power and distortion shall not differ from the values specified in **10.3** to **10.5** respectively.

11.3 Drop Test — This test should be conducted in accordance with IS : 9000 (Part VII/Sec 3) - 1979§, the number of drops being 6 and height of drop being 25 mm. There shall be no mechanical damage and no change in tape speed, reproduce system response, rated output power, distortion and wow and flutter from those specified in **10.1**, **10.3** to **10.5** and **10.7** respectively.

11.4 Operating Life Test

11.4.1 The tape recorder shall be subjected to an operating life test consisting of 2 hours operation and half-an-hour rest period for a total operating period of 500 hours.

11.4.2 Allowance should be made for normal attention such as change of cassette, change of batteries (for battery operated recorder), etc.

*Basic environmental testing procedures for electronic and electrical items: Part III Dry heat test.

†Environmental tests for electronic and electrical equipment: Part II Damp heat (cycling) test.

‡Basic environmental testing procedures for electronic and electrical items: Part II Cold test.

§Basic environmental testing procedures for electronic and electrical items: Part VII Impact test, Section 3 Drop and topple.

11.4.3 After the operating life duration the tape recorder shall meet the following requirements:

- a) Tape speed shall be as given in **10.1**;
- b) Wow and flutter shall not exceed ± 0.8 percent; and
- c) Reproduce system response, rated output power distortion shall not differ from the values specified in **10.3** to **10.5** respectively.

12. MARKING

12.1 The equipment shall be clearly and indelibly marked with the following:

- a) Manufacturer's name or trade-mark;
- b) Type or model number and serial number;
- c) Supply voltage [type of supply (ies), voltage(s) frequency];
- d) Maximum power consumption and/or battery drain; and
- e) Country of manufacture.

12.2 BIS Certification Marking

The product may also be marked with Standard Mark.

12.2.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

13. ADDITIONAL INFORMATION

13.1 Technical documentation containing circuit diagram, position of components as well as instructions and technical data for the type of equipment being supplied shall be provided.

A P P E N D I X A

(Clause 11.1.2)

SAMPLING AND CRITERIA FOR CONFORMITY

A-1. LOT

A-1.1 All the tape recording and reproducing equipments of the same model and type having the same design and manufactured by the same technique under eventually similar conditions of production shall constitute a lot.

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A-1.1.1 Samples shall be taken and tested to ascertain the conformity of each lot for acceptance tests.

A-2. SCALE OF SAMPLING

A-2.1 Tape recording and reproducing equipments shall be taken at random according to col 1, 2 and 3 of Table 4 (*see* IS : 4905-1968*).

TABLE 4 SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

(*Clauses A-2.1, A-3.1 and A-3.1.1*)

LOT SIZE (N) (1)	FIRST SAMPLE (N_1) (2)	SECOND SAMPLE (N_2) (3)	COMBINED SAMPLE ($N_1 + N_2$) (4)	ACCEPTANCE NUMBER (5)	REJECTION NUMBER (6)
Up to 150	5	5	10	0	2
151 to 300	8	8	16	0	2
301 and above	13	13	26	0	2

A-3. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-3.1 Tape recording and reproducing equipments shall be drawn from each lot according to col 1 and 2 of Table 4 and subjected to the acceptance tests specified in **9.1.2**. If an equipment fails in any one of the acceptance tests, it shall be called a defective. If the number of defectives found in the first sample (*see* col 2) is zero (*see* col 5), the lot shall be considered as conforming to the acceptance tests. If the number of defectives is equal to or greater than 2 (*see* col 6), the lot shall be considered as not conforming to the acceptance tests.

A-3.1.1 If the number of defectives is equal to 1, further sample of the equipment shall be taken according to col 3 of Table 4 and tested for all the acceptance tests. If the number of defectives in the combined sample (*see* col 4) is less than 2 (*see* col 6), the lot shall be considered as conforming to the acceptance test; otherwise rejected.

*Methods for random sampling.

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